

**TRANSLATION****PATENT COOPERATION TREATY****PCT****INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>23600996WO FRI/BHR</b>	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. <b>PCT/EP2005/001765</b>	International filing date (day/month/year) <b>21.02.2005</b>	Priority date (day/month/year) <b>21.02.2004</b>
International Patent Classification (IPC) or national classification and IPC <b>F16C33/12 F16C33/20</b>		
Applicant <b>KS GLEITLAGER GMBH</b>		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.	
2. This REPORT consists of a total of _____ sheets, including this cover sheet.	
3. This report is also accompanied by ANNEXES, comprising: a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>1</u> sheets, as follows: <input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).	
4. This report contains indications relating to the following items: <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application	

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2005/001765

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on translations from the original language into the following language \_\_\_\_\_ which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
  - ☐ publication of the international application (Rule 12.4)
  - ☐ international preliminary examination (Rule 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☐ the international application as originally filed/furnished

- ☒ the description:

pages 1-16 as originally filed/furnished

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

- ☒ the claims:

nos. \_\_\_\_\_ as originally filed/furnished

nos.\* \_\_\_\_\_ as amended (together with any statement) under Article 19

nos.\* 1 received by this Authority on 05.08.2005 with letter  
of 03.08.2005

nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

- ☒ the drawings:

sheets 1/2, 2/2 as originally filed/furnished

sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☒ The amendments have resulted in the cancellation of:

☐ the description, pages \_\_\_\_\_

☒ the claims, nos. 2-21

☐ the drawings, sheets/figs \_\_\_\_\_

☐ the sequence listing (specify): \_\_\_\_\_

☐ any table(s) related to sequence listing (specify): \_\_\_\_\_

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages \_\_\_\_\_

☐ the claims, nos. \_\_\_\_\_

☐ the drawings, sheets/figs \_\_\_\_\_

☐ the sequence listing (specify): \_\_\_\_\_

☐ any table(s) related to sequence listing (specify): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/EP2005/001765

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	<u>1</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1</u>	YES
	Claims		NO
2. Citations and explanations (Rule 70.7)			
1 Reference is made to the following documents:			
D1: EP-A-0 852 298 (FEDERAL-MOGUL DEVA GMBH) 8 July 1988 (1988-07-08)			
D2: US-A-5 217 814 (KAWAKAMI ET AL) 8 June 1993 (1993-06-08)			
D3: US-A-4 394 275 (BICKLE ET AL) 19 July 1983 (1983-07-19)			
2 NOVELTY			
2.1 Document D1 is considered to be the closest prior art with respect to the subject matter of claim 1. It discloses a:			
sliding bearing composite material comprising a metallic support layer, a metallic porous carrier layer which has been sintered or sprayed onto it and has a thickness of 100-500 $\mu\text{m}$ , and a sliding layer which forms a sliding surface for one sliding partner and is composed of a polymer-based sliding layer material which also fills the pores of the carrier layer, and where the sliding bearing			

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	<p>composite material has a pore volume of <u>at least</u> 40-48% by volume before any bending or rolling to shell shape or bush shape and is formed without lead.</p> <p>2.2 The subject matter of claim 1 therefore differs from the sliding bearing composite material known from D1 in that</p> <p>the sliding layer material comprises fillers which improve tribological properties and in that the porous carrier layer is formed from irregular particles of entirely irregular non-spherical geometry and in that the sliding layer material forms a projection above the porous carrier layer of 5-100 <math>\mu\text{m}</math> and comprises at least 50% by volume of PVDF or at least 60% by volume of PA or PES or PPS.</p> <p>2.3 Document D2 discloses a:</p> <p>sliding bearing composite material comprising a metallic support layer, a metallic porous carrier layer which has been sintered or sprayed onto it and has a thickness of 100-500 <math>\mu\text{m}</math>, in particular of 200-350 <math>\mu\text{m}</math>, and a sliding layer which forms a sliding surface for one sliding partner and is composed of a polymer-based sliding layer material which also fills the pores of the carrier layer and comprises fillers which improve tribological properties and has a pore volume of <u>at least</u> 40-48% by volume before any bending or rolling to shell shape or bush shape, and where the sliding bearing composite</p>

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
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material is formed without lead.

- 2.4 The subject matter of claim 1 therefore differs from the sliding bearing composite material known from D2 in that

the sliding layer material forms a projection above the porous carrier layer of 5-100  $\mu\text{m}$  and comprises at least 50% by volume of PVDF or at least 60% by volume of PA or PES or PPS, and in that the porous carrier layer is formed from irregular particles of an entirely irregular non-spherical geometry.

The porous carrier layer(s) known from D2 is/are formed only partly from irregular particles.

- 2.5 Document D3 discloses a:

sliding bearing composite material comprising a metallic support layer, a metallic porous carrier layer which has been sintered or sprayed onto it and has a thickness of 100-500  $\mu\text{m}$ , in particular of 200-350  $\mu\text{m}$ , and a sliding layer which forms a sliding surface for one sliding partner and is composed of a polymer-based sliding layer material which also fills the pores of the carrier layer and comprises fillers which improve tribological properties and where the porous carrier layer has a pore volume of at least 40-48% by volume before *any* bending or rolling to shell shape or bush shape, and where the sliding layer material forms a projection above the

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
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porous carrier layer of 5-100  $\mu\text{m}$  and comprises at least 50% by volume of PVDF.

- 2.6 The subject matter of claim 1 therefore differs from the sliding bearing composite material known from D2 in that

the porous carrier layer is formed from irregular particles of an entirely irregular non-spherical geometry, and in that the sliding bearing composite material is formed without lead.

- 2.7 The subject matter of claim 1 is therefore novel over D1, D2 and D3.

### 3 INVENTIVE STEP

- 3.1 The problem addressed by the present invention can therefore be considered that of providing, while retaining good attachment of the sliding layer material to the carrier layer, a qualitatively high-value sliding bearing element by deforming the sliding bearing composite material, avoiding the problem of the wall thickness rise of the sliding layer.

- 3.2 The solution proposed for this problem in claim 1 of the present application involves an inventive step for the following reasons (PCT Article 33(3)):

With the porous carrier layer formed from irregular

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International application No.

PCT/EP2005/001765

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
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particles of an entirely irregular non-spherical geometry, a pore volume of at least 40% by volume is achieved. With this carrier layer formed from irregular particles, less polymer sliding layer material is displaced radially inwards from the pores in deforming operations, which would lead to a rise in wall thickness.

The combination of features of claim 1 is neither disclosed nor suggested by documents D1, D2 and/or D3.

#### 4 INDUSTRIAL APPLICABILITY

- 4.1 The inventive sliding bearing composite material is usable, for example, in connecting rod bearings or main bearings/main bearing shells in internal combustion engines.